ENERGY NORTHWEST

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GO2-10-042

10 CFR 50.73

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555-0001

Subject: **COLUMBIA GENERATING STATION, DOCKET NO. 50-397**
LICENSEE EVENT REPORT NO. 2008-001-01

Dear Sir or Madam:

This submittal provides an update to Licensee Event Report No. 2008-001-00 which reported a reactor scram event at Columbia Generating Station on August 21, 2008. This revision updates the direct and root causes as well as the corrective actions for the event based on a recent re-evaluation of the event. The re-evaluation determined that the causes for this event were the same as a subsequent event occurring on February 8, 2009 and documented in LER 2009-001-01.

There are no commitments being made to the NRC herein. If you have any questions or require additional information, please contact Mr. M.C. Humphreys at (509) 377-4025.

Respectfully,

W.S. Oxenford
Vice President, Nuclear Generation & Chief Nuclear Officer

Enclosure: Licensee Event Report 2008-001-01

cc: NRC Region IV Administrator
NRC NRR Project Manager
INPO Records Center
NRC Sr. Resident Inspector – 988C (2)
R.N. Sherman – BPA/1399
W.A. Horin – Winston & Strawn
W.C. Walker – NRC RIV/fax

IE22

NRR

NRC FORM 366 (9-2007) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 08/31/2010

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Columbia Generating Station	05000397	1 OF 4

4. TITLE

Reactor Scram due to Failed Compression Fitting

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER 05000
08	21	2008	2008	– 001	–01	03	16	2010	FACILITY NAME	DOCKET NUMBER 05000

9. OPERATING MODE
1

10. POWER LEVEL
65

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)*

☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
☐ 20.2203 (a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☒ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ OTHER
☐ 20.2203(a)(2)(vi)	☐ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER *(Include Area Code)*
Donald W. Gregoire, Engineering Specialist	509-377-8616

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
D	JJ	TBG	SS23	Y					

14. SUPPLEMENTAL REPORT EXPECTED	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO				

ABSTRACT

On August 21, 2008, an automatic reactor scram occurred at 1606, while the plant was operating at 65% power due to the Digital Electrohydraulic Control (DEH) trip header momentarily depressurizing during post maintenance testing (PMT). All safety systems were available during the event and operated as designed. Plant operators effectively managed the transient. This event did not pose a threat to the health and safety of the public.

The direct cause of the reactor scram was instantaneous recompression of an air bubble trapped in the intervalve cavity between the A and B Quadvoter valves during post-maintenance testing (PMT). This allowed backflow of DEH fluid from the emergency trip header into the intervalve cavity during PMT, causing a momentary depressurization of the DEH trip header that resulted in the reactor scram. The root cause of the scram was determined to be a design deficiency in the on-line serviceable Quadvoter assembly which allowed an air bubble to remain in the intervalve cavity following performance of on-line maintenance activities.

LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET

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NARRATIVE

Plant Conditions

At the time of the event, the plant was operating in Mode 1 at 65% power for planned maintenance on Reactor Feedwater [SJ] Pump 1B (RFW-P-1B) coupling. Maintenance on RFW-P-1B was ongoing and the pump was out of service.

Event Description

On August 21, 2008, during performance of post maintenance testing of the DEH system following the planned replacement of the Channel B DEH Solenoid Trip Valve (DEH-SV-TRIP/B), the Digital Electrohydraulic Control (DEH) trip header momentarily depressurized because of the instantaneous recompression an air bubble trapped in the intervalve cavity between the A and B Quadvoter valves. Coincident with this event was the failure of a DEH compression fitting and the subsequent loss of DEH fluid. The failure of the compression fitting was previously believed to be the cause of the event. However, the evaluation of a subsequent and similar event in February 2009 (Reference Columbia LER 2009-001-01) determined that both events were caused by the same mechanism (a design deficiency in the on-line serviceable Quadvoter assembly).

Per design, the low trip header pressure actuated the RPS system, scramming the reactor [RCT], via the Turbine Governor Valve Fast Closure, Trip Oil Pressure – Low signal. A recirculation [AD] pump trip was also associated with the scram. The scram occurred at 1606 hours and was followed by a main turbine [TA] trip about 23 seconds later.

The control room received a low DEH tank level alarm at about 1608 and dispatched an equipment operator to investigate. The equipment operator confirmed a DEH system leak that was not directly related to the maintenance previously performed on the DEH system. The control room operators secured the DEH pumps to limit the leak.

To prevent stratification, a reactor recirculation pump was restarted at about 1623, and the control room staff continued to monitor stable pressure decay and cooldown. By 1719, the DEH tank level had stabilized at 16.25 inches. As a result of the event, the DEH tank level dropped about 18 inches indicating a loss of approximately 90 gallons of Fyrquel hydraulic fluid. At 1930, the NRC Operations Center was notified in accordance with 10 CFR 50.72(b)(2)(iv)(B) via Event Notification #44432.

Immediate Corrective Actions

The turbine building [NM] sump pumps were stopped, and plant staff was dispatched to isolate, monitor and clean up the spill. The hydraulic line was reworked by reinstalling the existing tubing with a new, properly assembled compression fitting.

Assessment of Safety Consequences

This event did not pose a threat to the health and safety of the public. All safety systems operated as designed and there were no conditions that prevented the fulfillment of any safety function described in 10 CFR 50.73(a)(2)(v). There was no resultant loss of mitigating equipment or functions, nor would such a loss be anticipated under any credible alternate conditions.

Following the scram, reactor pressure was controlled initially via bypass valves while DEH pressure was adequate, and subsequently with main steam line drains. Reactor level was controlled to within the normal band with the feedwater and condensate systems [SD]. By keeping reactor water level within the normal band, and avoiding controlling pressure through safety relief valves, the challenge to the reactor pressure vessel posed by the scram was reduced.

The consequences of a similar event at full power instead of the lower power level of this event would not have been considerably more serious. The sequencing of the turbine trip lagging the scram by approximately 23 seconds did result in a water level swell that almost reached the level 8 (L8) trip setpoint. The timing of the turbine trip relative to the scram is not assumed to be constant and as such, exact response is difficult to ascertain. Under certain scenarios the L8 trip would be reached and might result in the need to restart a feedwater pump during the scram recovery, presenting a potential complication to the operators. Actual plant response during an event causing a L8 trip would still be bounded by the Final Safety Analysis Report (FSAR) Chapter 15 – Feedwater Controller Failure – Maximum Demand analysis. Improvements to the feedwater level control logic will be evaluated to determine if system design changes are necessary to further minimize the potential for a L8 trip during similar conditions in the future.

Cause of Event

The direct cause of the reactor scram was instantaneous recompression of an air bubble trapped in the intervalve cavity between the A and B Quadvoter valves during post-maintenance testing (PMT). This allowed backflow of DEH fluid from the emergency trip header into the intervalve cavity during PMT, causing a momentary depressurization of the DEH trip header that resulted in the reactor scram. The root cause of the scram was determined to be a design deficiency in the on-line serviceable Quadvoter assembly which allowed an air bubble to remain in the intervalve cavity following performance of on-line maintenance activities.

Similar Events

There were no similar events prior to this event occurring. The Quadvoter assembly was installed in 2007 (R-18) as part of the Digital Electrohydraulic Control (DEH) system upgrades and is part of the Main Turbine Trip subsystem. This event was related to the design of the new system.

However, it should be noted that during the re-evaluation of a subsequent event occurring in February 2009 (Reference Columbia LER 2009-001-01), it was determined that both events were related and caused by the same design deficiency.

Corrective Actions

Corrective actions taken to address the event described in LER 2009-001-01 also address the root cause of this event. They include:

Quadvoter "A" was replaced to ensure both valves in at least one DEH trip channel were new. With the reactor shutdown in Mode 4, the system was operated and vented until testing verified no air remained entrapped and no significant pressure transients resulted from solenoid valve operation.

To permit future on-line replacement of quadvoter valve assemblies, design modifications to the DEH system were implemented during the R-19 outage. The modifications allow venting of the DEH system following maintenance, prevent depressurization of the trip header during pressure transients, provide quadvoter solenoids that operate within the normal temperature range of the DEH hydraulic fluid, and provide a pressure monitoring system for the trip header.

In addition, a number of corrective actions have been identified that address Senior Management decision making, communication, and resource management.

Energy Industry Identification System (EIIS) Information codes from IEEE Standards 805-1984 and 803-1983

EIIS codes are represented in brackets as [XX] and [XXX] throughout the body of the narrative.